

UREDINALES OF THE ANDES, BASED ON COLLECTIONS BY DR. AND MRS. ROSE

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The uredinalean flora of the highlands of western South America is a rich and varied one. This can be seen even from the scattered literature, for as yet no extended or monographic work covering this region has been published. Probably Chile has received the most attention, beginning with the 11 species included in LÉVEILLÉ's paper of 1846 on "Descriptions des champignons de l'herbier du Muséum de Paris" (Ann. Sci. Nat. III. 5:111-167, 249-304), and MONTAGNE's treatment of the fungi in the eighth volume of GAY's "Historia fisica y politica de Chile," issued some 10 years later, down to the 21 species of rusts in SPEGAZZINI's "Fungi Chilenses" of 1910. The article which includes the greatest number of rusts, however, and by far the most important single work treating of the Andean Uredinales, is MAYOR's "Contribution à l'étude des Urédinées de Colombie" (Mém. Soc. Neuch. Sci. Nat. 5:442-599), published in 1913. In this work are 158 species, of which 84 are described as new, and most of the species are admirably illustrated with drawings of the several forms of spores. Not all of these, however, are from the mountainous part of Colombia. A rough estimate will place the number of rusts now named from the Andes at about 250 species, which is probably not half the total number eventually to be found.

For more than three-quarters of a century explorers and travelers have picked up, more or less incidentally, the parasitic fungi of the Andes, and when the day comes for a comprehensive and inclusive study of all available material, the man who has patience and ingenuity to bring together this widely scattered wealth of material will find no mean resources for a systematic account of an interesting region. Probably specimens oftenest encountered in herbaria are

¹ Reprints may be obtained by application to the Botanical Department, Purdue University Agricultural Experiment Station, Lafayette, Ind., under whose auspices the work was carried on.

those collected by Dr. G. VON LAGERHEIM, the eminent mycologist of Stockholm, Sweden, who spent some time at Quito, Ecuador. He published no connected account of his work at Quito, although in a "vorläufige Mittheilung," describing 4 new genera (Ber. Deutsch. Bot. Gesell. 9:344. 1891), he speaks of "my detailed 'Monographie der Uredineen Ecuadors,' now in course of completion." He, however, distributed his material freely, not only the specimens which he was able to positively identify, but others as well, partly unnamed and partly with suggested names for forms that appeared to be new species. This mine of rich material, for many strange forms are being uncovered from time to time and placed in newly erected genera or made to explain obscure relationships, has been drawn upon in the present paper, and 3 of the LAGERHEIM species are here published, one in a new genus, and all in genera other than previously suggested.

The present contribution to the rusts of the Andes, with the exception of 3 collections by LAGERHEIM and two by ULE, comprises material secured by Dr. and Mrs. J. N. ROSE during a South American exploration in 1914 primarily for cacti. Dr. ROSE's broad botanical interests and generous disposition toward workers in other botanical lines than his own were shown in his letter of May 8, 1914, to the writer, announcing his proposed trip: "You will probably be surprised," he says, writing from the National Museum, "to learn that Mrs. ROSE and I plan to leave here (Washington, D.C.) about June 10 for an extended trip through western South America, especially Peru and Chile. I wonder whether it will be worth while to collect any of the parasitic fungi." Upon assuring him that the region to be visited was one of more than ordinary interest to American uredinologists he wrote shortly before departing: "I shall take great pleasure in collecting all of this kind of material (rusts) that I can."

In transmitting the rust collections, 40 numbers in all, after his return from 6 months in South America, he says: "I fear that you will be disappointed that there are so few of them," and as explanation for the small number, "because I have been trying to collect parasitic fungi where none grew," in the dry regions of western South America where species of *Cactus* most abound. He also felt

that "most of them must be common things, as they were picked up on weeds."

Perusal of the following account will reveal the value of keeping rust collecting "in mind all summer," even in a region where rusts do not flourish. Twenty-two collections are of species that may be called widespread and common, most of them on what might be designated as weeds, two-thirds belonging to a single species of *Coleosporium*. Although these were well worth collecting to illustrate geographical and host distribution, yet the other 18 collections receive the chief attention, as they embrace 6 new species and 6 species not often found. Altogether the 40 numbers drop into 21 species of Uredinales, of which about one-fourth require to be described as new, as many more are rare and little known forms, while only about one-third can be called common. The results should be gratifying to Dr. and Mrs. ROSE, and certainly will be particularly helpful to students of the rust portion of the Andean flora. Four species by other collectors make a total of 25 species here recorded.

1. *COLEOSPORIUM SENECTIONIS* (Pers.) Fries (on *Carduaceae*).—*Senecio adenotrichos* DC.,² Palos Quernados, Chile, October 4, II, no. 19188; vicinity of Choapa, Chile, October 6, II, no. 19194; vicinity of Illapel, Chile, October 6, II, no. 19238; Las Palmas, Chile, October 16, II, no. 19363; west of La Ligua, Chile, October 22, II, no. 19390.—*S. fistulosus* Poepp. (?), vicinity of Choapa, Chile, October 6, II, no. 19196.—*S. glabratus* H. and A., Los Molles, Chile, October 22, II, no. 19398.—*S. hakeaefolius* Bert., vicinity of Illapel, Chile, October 6, II, no. 19248; La Serena, Chile, October 9, II, no. 19267.—*S. thinophilus* Phil. (?), vicinity of La Serena, Chile, October 10, II, no. 19288.—*S. vulgaris* L., Santa Inez, Chile, October 16, II, no. 19497.—*Senecio* sp., Cerro Grande, Chile, October 10, II, no. 19495; vicinity of La Serena, October 11, II, no. 19312; La Paz, Bolivia, August 15, II, no. 18909.

It is remarkable that this rust, very common in Europe, should be so abundant in Chile, and apparently also in Argentina, while it is yet practically a stranger in North America. The aecia occur

² All collections are to be credited to Dr. and Mrs. J. N. ROSE, and for the year 1914, unless otherwise stated.

on the leaves of pine. It was collected at Providence, Rhode Island, in 1883, on *Senecio vulgaris*, but apparently soon disappeared, and has not been reported again from any station in North America.

It will be observed that all the collections recorded, most of them being very ample, contain no telia. This may indicate that the aecia on pine are rare or absent from the region, and that the rust is reproduced by means of its urediniospores chiefly or wholly.

2. *CHRYSOCELIS LUPINI* Lagerh. and Diet. (on Fabaceae).—*Lupinus paniculatus* Desr. (?), Cuzco, Peru, September 1, III, no. 19050.

The genus *Chrysocelis* was founded in 1913, upon studying material from Colombia, submitted by Dr. EUG. MAYOR to Dr. P. DIETEL (MAYOR, Contribution à l'étude des Urédinées de Colombie, Mém. Soc. Neuch. Sci. Nat. 5:542-544). The type is on an undetermined species of *Lupinus* from near Bogota at 3000 m. altitude (no. 95), and accompanied by another collection from the same region at 2600 m. (no. 95a). These specimens were compared with similar collections made by LAGERHEIM in Ecuador 20 years earlier on 3 species of *Lupinus*, one of which has been examined by the writer.

This is a rust quite unlike any other known. It is a long cycle form with pycnia, aecia, and telia, and in all collections previously recorded sori of both aecia and telia are present. In the discussion following the founding of the genus, the somewhat unusual nature of the aecia, and the doubtful affinities of the rust are considered. From my own study I am inclined to dissent from the tentative conclusion that the rust is not to be referred to the Uredinaceae (Melampsoraceae), but to the Aecidiaceae (Pucciniaceae), because of the superficial character of the telia and the lack of lateral adhesion of the teliospores. Both of these conditions can be harmonized, I believe, with requirements for the former family, rather than the latter, and such characters as the cylindrical and sessile teliospores, and the highly pulverulent spore chains of the aecia, or possibly they are uredinia, would further lend countenance to this view.

3. **Uropyxis quitensis** Lagerh., sp. nov. (on Berberidaceae).—*Berberis* sp., Quito, Ecuador, April, 1891, II, III, *G. Lagerheim*.

Uredinia and telia hypophyllous, few, but with numerous spores scattered over the leaf surface, yellowish; urediniospores globoid or broadly ellipsoid, 19–23 by 23–24 μ , the wall nearly or quite colorless, finely and closely echinulate, thin, 1 μ , the pores indistinct; teliospores broadly ellipsoid, 20–23 by 21–26 μ , rounded at both ends, or flattened and sometimes introverted by drying, slightly or not constricted at septum, the wall pale cinnamon brown or nearly colorless, thin, 1–1.5 μ , smooth, the pores obscure but seemingly lateral; pedicel short, fragile, usually attached more or less obliquely, breaking away near the spore.

The spores are more delicate than in other known species of the genus, and the germ pores correspondingly more indistinct. It is also the first species to show smooth teliospores, although in *U. texana* they are so little roughened as to appear smooth by the usual method of examination. The obliquely attached pedicels and the thin walls of the teliospores evidently led LAGERHEIM to attach the tentative name of *Sphenospora quitensis* to the specimens which he distributed.

Cleptomycetes, gen. nov.

Cycle of development includes pycnia and telia, both subepidermal.

Pycnia flask-shaped, with ostiolar filaments.

Telia erumpent, definite; teliospores pedicillate, 2-celled with transverse septum; wall laminate, inner layer firm, colored, outer layer more or less hygroscopic, colorless, overlaid by the verrucose cuticle, the pores 4 or more and equatorial or scattered.

Type species, *Puccinia Lagerheimiana* Dietel (*Hedwigia* 31:288. 1892).

4. **Cleptomycetes Lagerheimianus** (Dietel), comb. nov. (on Verbenaceae).—*Aegiphila* sp., Toldo near Riobamba, Ecuador, August 1891, O, III, *G. Lagerheim*.

This short cycle species from the Ecuadorian province of Chimborazo was styled by DIETEL “a very remarkable one” in his extended comments following the original technical description of *Puccinia Lagerheimiana*. He was especially impressed with the number and arrangement of the germ pores, but decided that these did not constitute sufficient grounds on which to remove it from the

genus *Puccinia*. Ten years later, however (Hedwigia Beibl. 41: 112), he placed it under *Uropyxis*, a genus which he considered well separated from *Puccinia* and *Phragmidium* by the following group of characters: (1) multiple number of germ pores, (2) formation of a hygroscopic layer in the wall, (3) inclination toward the production of more than two cells in the spore, these characters all applying to the teliospore.

It was an important advance in recognizing the need of a group of characters in delimiting genera among the rusts. Not until 1905, when the writer presented a classification of the rusts before the Vienna Congress, was the principle extended to include characters from all the stages in the life cycle, and foremost of all from the nature of the cycle itself. Unfortunately, such a criterion for rust genera is yet too little recognized.

The combination of characters used to establish the present genus is: (1) the short life cycle, (2) subepidermal pycnia, (3) more than two germ pores, (4) a hygroscopic layer, (5) a closely verrucose cuticle. Characters 1 and 4 ally the genus with *Calliospora*, the correlated short cycle form of *Uropyxis*; characters 3 and 5 with *Phragmidium*; but in no genus heretofore recognized is the full combination of characters to be found.

The germ pores in this species appear somewhat variable, but are usually 5 and approximately equatorial. The surface of the spores is moderately and closely verrucose, almost rugose-verrucose. The pedicel is fragile, and usually breaks away close to the spore. A rather full description of the species is given in SYDOW, Monog. Ured. 1:843.

5. **Sphenosporea Berberidis** Lagerh., sp. nov. (on Berberidaceae).—*Berberis glaucescens* St. Hil. (?), Tahatanga, Ecuador, September 1891, III, G. Lagerheim.

Uredinia and telia hypophyllous, segregated on somewhat discolored spots; urediniospores globoid or broadly ellipsoid, 19–22 by 23–26 μ ; wall pale cinnamon brown or colorless, 1.5–2 μ thick, moderately echinulate, the pores obscure; teliospores ellipsoid or elliptic, 21–24 by 26–32 μ ; wall pale cinnamon brown, thin, 1 μ , slightly thicker above, 1.5–3 μ , smooth; pedicel colorless, as long as the spore, fragile, breaking off near the spore.

The species was distributed by LAGERHEIM with the herbarium name *Diorchidium Berberidis*. It appears, however, to be a genuine member of the genus *Sphenospora*, as judged by the exactly vertical septum, the thin and smooth walls of the teliospores, and other characters of both urediniospores and teliospores. The urediniospores were few in the specimen examined. The pores of the teliospores were not demonstrated, but seem to be apical. The pores in the genus *Diorchidium* are lateral, and only the type species on a Fabaceous host from south Africa is yet known, although *Puccinia Piptadeniae* P. Henn. from Brazil may prove to belong in the genus when well studied.

The host was given as *Berberis glaucophylla* on the packet, which was doubtless intended for *B. glaucescens*, although the determination has not been established. The leaves are large, thin, and markedly glaucous beneath.

6. UROMYCES LEPTODERMUS Sydow (on Poaceae).—*Panicum barbinode* Trin., Santa Clara, Peru, July 18, II, no. 18723.

A common and widely distributed species of warmer regions. It reaches northward through Central America and the West Indian Islands to central Mexico and southern Florida. It also occurs in India. The aecia are unknown.

7. UROMYCES CRASSIPES Diet. and Neg. (on Polygonaceae).—*Rumex cuneifolius* Campd., below Cuzco, Peru, September 2, II, no. 19070.

The species has been collected on the same host in the vicinity of Concepción, Chile, as stated by SPEGAZZINI in his "Fungi Chilenses" (p. 16). The species was also collected at Ollantaytambo, Peru, at 3000 m., apparently on the same host and showing uredinia only, May 17, 1915, Cook and Gilbert 783.

8. UROMYCES ELATUS Sydow (on Fabaceae).—*Lupinus saxatilis* Ulbrich (?), vicinity of La Paz, Bolivia, August 12, O, III, no. 18863.—*L. tomentosus* DC., below Pampa de Arrieros, Peru, August 23, I, no. 18962.

The species has rarely been collected. The aecia are conspicuous and have long peridia when fully developed. The telia are usually closely associated with the aecia; they are very small,

and give only a powdery appearance to the surface, the teliospores being small, thin-walled, very pale, and germinating freely upon maturity.

9. **UROMYCES HOWEI** Peck (on *Asclepiadaceae*).—*Asclepias curassavica* L., vicinity of Lima, Peru, July 24, II, no. 18770.

A very common species of rust throughout North and South America. Only uredinia are collected, except in the north temperate part of the range.

10. **UROMYCES CESTRI** Mont. (on *Solanaceae*).—*Cestrum* sp., Illapel, Chile, October 7, I, no. 19275.

The species was first described from the island of Juan Fernandez, Chile, in 1835, and is now known as a common tropical rust of both North and South America.

11. **Puccinia Bambusarum** (P. Henn.), comb. nov. (on *Poaceae*).—*Arundinaria* sp.

An ample portion of the type collection of *Uredo Olyrae* P. Henn. (*Hedwigia* 43:164. 1904) recently became available for study. On this material there were found not only uredinia, but also telia. The latter are so small and inconspicuous as to easily escape notice. The collection, only one having been recorded so far under this name, was made in the northeastern part of Peru and in the plain region some distance from the high mountains, but for convenience the discovery of the teliospores may be recorded here.

Uredo Olyrae was reported to be on *Olyra* sp., a genus belonging to the tribe Paniceae, but upon examining the material now in the Arthur herbarium, Mrs. AGNES CHASE, agrostologist of the Department of Agriculture, Washington, says "there is no known species of *Olyra* with bristles at the summit of the sheath as in this specimen. These bristles are found in several genera of bamboos. I think this specimen is a species of *Arundinaria*." The specimen examined was distributed as "E. Ule, Appendix Mycothecae Brasiliensis, no. 5, Peru, Iquitos, 1902." A part of the same type collection, kindly sent to me in 1913 from the Berlin Museum, gives the collector's no. 3161 and the date July 1902.

In a similar way examination of type material of *Uredo Bambusarum* P. Henn. (*Hedwigia* 35:255. 1896) discloses both uredinia

and telia, agreeing closely with the preceding. This collection was made in the state of St. Catharine, Brazil, and published as on *Bambusa* sp., *E. Ule* 866. A part of the same collection sent me by E. W. D. HOLWAY supplies the additional data "Blumenau, July 1888," and gives the host as "*Olyra micrantha*." Mrs. AGNES CHASE has examined this material and considers that it is some kind of bamboo, not identical with the preceding, and very probably *Arundinaria amplissima*, a species not uncommon in Brazil.

The two forms are herewith combined under one name. The following emended description is drawn from the original collections by E. ULE. From a misinterpretation of the specific characters the name *Uredo Olyrae* was introduced into the literature of the North American rusts (*Mycologia* 8:21. 1916), but the error was corrected later (*ibid* 9:92. 1917).

Uredinia amphigenous, scattered, elliptical, small, 0.5 mm. or less long, cinnamon brown; paraphyses none; urediniospores ellipsoid or obovoid, 18–23 by 23–29 μ ; wall pale yellow or light golden brown, thin, 1–1.5 μ , rather sparsely and prominently echinulate, the pores obscure.

Telia few, like the uredinia in size and position, early naked, slightly darker in color; teliospores irregularly ellipsoid, often with the septum oblique, very small, 12–15 by 18–26 μ , rounded above, somewhat tapering below, slightly constricted at septum; wall cinnamon brown, moderately and uniformly thin, about 1.5 μ , smooth; pedicel colorless, one-third length of spore or less.

12. **Puccinia Roseanae**, sp. nov. (on Amaryllidaceae).—*Tecophilaea Roseana* Esposto ined., vicinity of Santa Clara, Peru, July 6, I, III, no. 18608.

Pycnia chiefly epiphyllous, numerous in loose groups, honey yellow becoming light brown, conspicuous, subepidermal, flask-shaped, about 130 μ in diameter.

Aecia hypophyllous, crowded in annular groups 3–6 mm. across, on larger discolored spots, cupulate, 0.2–0.4 mm. in diameter, the margin somewhat reverted, erose or lacerate; peridial cells rhomboidal, 18–26 by 22–30 μ in face view, abutted or slightly overlapped, the inner surface verrucose; aeciospores globoid, 16–23 by 18–27 μ ; wall nearly or quite colorless, thin, 1 μ , inconspicuously verrucose.

Telia epiphyllous, scattered, oblong, 0.5–0.8 mm. long, prominent, long covered by the gray epidermis, light chestnut brown,

somewhat pulverulent, ruptured epidermis conspicuous; teliospores oblong, 23–27 by 42–52 μ , rounded at both ends, slightly or not constricted at septum; wall cinnamon brown, 2.5–3 μ thick, thicker above by addition of a pale umbo, 5–7 μ , with prominent, longitudinal ridges 3–5 μ apart; pedicel colorless, as long as the spore, fragile.

It is a pleasure to have the privilege of dedicating this striking new species of rust to Dr. and Mrs. J. N. ROSE, whose interest in the broad aspects of systematic botany could no better be attested than by the interesting collection of rusts reported in this article, made while studying the habits and distribution of certain groups of flowering plants. The rust is apparently quite unlike any previously described species, and occurs on a rare host, dedicated to Dr. ROSE.

13. **Puccinia Mogiphanis** (Juel), comb. nov. (on Amaranthaceae).—*Achyranthes* sp., Oroya, Peru, July 14, III, no. 19498; Pasco, Peru, August 6, II, III, no. 18804.

The material submitted by Dr. and Mrs. ROSE agrees in its uredinia with type material (Vestergren, *Micr. Rar. Sel.* 794) of *Uredo Mogiphanis* Juel (*Bih. K. Sv. Vet.-Akad. Handl.* 23(3)¹⁰:24. fig. 35. 1897), but shows in addition an abundance of telia. JUEL describes and figures the urediniospores as thin-walled, probably due to mistaking the cuticle for the whole wall, and the thick inner portion of it for cell contents. The wall is in fact 3–4 μ thick, and when well matured somewhat darker than indicated by JUEL. The pores are often 3 or 4, and somewhat equatorial, although more often 6 and unmistakably scattered, as JUEL says.

The telia are amphigenous, 0.5–1 mm. across, similar to the uredinia, soon naked, chestnut brown. The teliospores are ellipsoid or obovoid, 29–31 by 39–50 μ , rounded at both ends, or somewhat narrowed at base, slightly constricted at septum. The wall is chestnut brown, 2.5–3.5 μ thick, becoming noticeably thicker above, 7–10 μ . The pedicel is one to one and a half times the length of the spore, 7–9 μ thick and hyaline.

It is to be regretted that the Amaranthaceous hosts of neither the type material of *Uredo Mogiphanis*, collected in Brazil in 1904, and said to be on *Mogiphanes*, nor of the present collections from

Peru, have been specifically determined. ENGLER and PRANTL in their *Pflanzenfamilien* include *Mogiphanes* and *Telanthera* under *Alternanthera*, and all three appear to be the same as *Achyranthes*.

14. PUCCINIA MALVACEARUM Mont. (on Malvaceae).—*Malva sylvestris* L., Palos Quernados, Chile, October 4, no. 19186; Las Cardas, Chile, October 14, no. 19344.—*Malvastrum capitatum* (Cav.) Griseb., Copiapó, Chile, October 12, no. 19322.

A short cycle species and one of the commonest and best known rusts, which has spread from its original center in the Andes to all parts of the world where members of the Malvaceae grow.

15. PUCCINIA HYDROCOTYLES (Link) Cooke (on Ammiaceae).—*Hydrocotyle bonariensis* Lem., vicinity of Lima, Peru, July 24, II, no. 18768.—*H. ranunculoides* L.f., vicinity of Choapa, Chile, October 6, II, no. 19192.

A long cycle rust, usually gathered in the uredinial stage. The initial stage is not definitely known. It is not uncommon throughout South America, as well as northward into the United States.

16. **Puccinia Nicotianae**, sp. nov. (on Solanaceae).—*Nicotiana tomentosa* Ruiz and Pav., Santa Clara, Peru, July 18, O, I, III, no. 18722.

Pycnia epiphyllous, small, inconspicuous, honey yellow becoming darker, subepidermal, globose or flask-shaped, 112–120 μ wide.

Aecia epiphyllous, scattered, low cupulate, 0.1–0.2 mm. in diameter; peridium colorless, the margin recurved and lacerate; peridial cells loosely joined, abutted; aeciospores ellipsoid or globoid, 13–18 by 16–19 μ ; wall pale yellow or colorless, thin, 1–1.5 μ , finely and inconspicuously verrucose.

Telia epiphyllous, scattered, among and in the old aecial cups, round, small, 0.1–0.2 mm. across, early naked, somewhat pulverulent, blackish brown, ruptured epidermis evident; teliospores ellipsoid or obovoid, 19–24 by 31–40 μ , usually rounded at both ends, sometimes narrowed below, not or only slightly constricted at septum; wall dark chestnut brown, 2.5–3 μ thick, somewhat thicker above up to 5 μ , finely and sparsely verrucose; pedicel tinted, short, fragile.

17. **Puccinia Acnisti**, sp. nov. (on Solanaceae).—*Acnistus arborescens* Schl., Santa Clara, Peru, July 18, O, I, III, no. 18722a.

Pycnia epiphyllous, appearing scattered or somewhat grouped, honey yellow becoming dark brown, noticeable, subepidermal, globoid, 70–125 μ in diameter.

Aecia amphigenous, appearing scattered or somewhat grouped, short cylindric, 0.1–0.2 mm. in diameter, 0.3–0.7 mm. high; peridium white, lacerate, soon falling apart; peridial cells rectangular or rhomboidal, 10–14 by 22–26 μ , slightly overlapping, the outer wall 3–4 μ thick, transversely striate, the inner wall about 3 μ thick, closely and somewhat coarsely rugose-verrucose; aeciospores ellipsoid, 16–19 by 19–27 μ ; wall colorless or slightly tinted, 1–2 μ thick, finely and closely verrucose.

Telia mostly epiphyllous, scattered, round, minute, 0.1–0.2 mm. in diameter, somewhat pulverulent, shining blackish brown, ruptured epidermis evident; teliospores ellipsoid or oblong, 19–24 by 27–35 μ , rounded at both ends, slightly or not constricted at septum; wall dark chestnut brown, uniformly 2.5–3 μ thick, smooth; pedicel yellowish, slightly darker above, somewhat fragile.

18. *Puccinia spegazzinii* DeToni (on *Carduaceae*).—*Mikania scandens* (L.) Willd. (?), Santa Clara, Peru, July 18, no. 18724.

A very abundant, short cycle rust, found throughout tropical America.

19. *Puccinia cuzcoensis*, sp. nov. (on *Carduaceae*).—*Baccharis floribunda* H.B.K. (?), Cuzco, Peru, September 1, I, II, no. 19054.

Aecia amphigenous, few, crowded in circinating groups, 3–5 mm. across, rather large, 0.2–0.4 mm. across, or confluent into curved sori 2 mm. long; peridium none, the epidermis overarched and rupturing centrally; aeciospores angularly ellipsoid or globoid, 21–26 by 29–35 μ ; wall pale yellow or colorless, 2–3 μ thick, closely and finely verrucose.

Uredinia chiefly hypophyllous, numerous, scattered, roundish, 0.2–0.5 mm. across, early naked, pulverulent, chestnut brown, ruptured epidermis prominent; urediniospores rhombic-ellipsoid, 27–34 by 39–42 μ ; wall golden or cinnamon brown, thick, 2.5–3 μ , very closely and rather bluntly echinulate, the pores large and distinct, 2, equatorial.

Telia not seen.

The species in its aecia, both from their caeomate structure and spores, is very much like *Puccinia Montoyae* Mayor, described on the same host from Bogota, but no teliospores are available with which to make a comparison, and the abundance of very conspicuous

uredinia is much in contrast to their entire absence in the Bogota material. The habitats are similar, but Bogota is a thousand miles or more north of Cuzco.

20. **Puccinia unicolor**, sp. nov. (on Carduaceae).—*Baccharis hemiprionoides* Bak., Cuzco, Peru, September 1, II, III, no. 19030.

Urediniospores intermixed with the teliospores, globoid or broadly ellipsoid, 21–23 by 23–26 μ ; wall pale yellow, thin, 1–1.5 μ , closely and rather finely echinulate, the pores indistinct.

Telia hypophyllous, scattered, round, 0.2–0.5 mm. across, early naked, pulvinate, chestnut brown, ruptured epidermis inconspicuous; teliospores ellipsoid or oblong, 24–34 by 42–48 μ , rounded or obtuse at both ends, slightly constricted at septum; wall lemon yellow, thick, 2.5–3 μ , thicker above with slight trace of an umbo, 7–9 μ , smooth; pedicel somewhat tinted next the spore, as long as the spore, the wall thin, 1 μ .

The telia often thickly cover the under side of the whole leaf. The species is much like that of *P. sphenica* Arth., on *Baccharis sordescens* DC., from Mexico, but does not agree exactly, and the hosts are quite unlike.

21. PUCCINIA SPILANTHIS P. Henn. (on Carduaceae).—*Spilanthus ciliata* H.B.K., Santa Clara, Peru, July 18, II, III, no. 18727.

The species has been reported from Brazil and Argentina. It differs from *P. spilanthicola* Mayor, occurring on the same and other species of *Spilanthus* in Colombia, by the larger and paler teliospores, and the absence of mesospores. Although the teliospores germinate at maturity, yet in the present collection there occur intermixed urediniospores, not mentioned in the original description. They are globoid or obovoid, 24–29 by 26–34 μ , with a cinnamon brown wall, 1.5–2 μ thick, closely echinulate, and with 4 equatorial pores.

22. PUCCINIA sp. (on Carduaceae).

Genus and species undetermined, near Mollendo, Peru, August 25, II, III, no. 18986; same, O, I, II, III, no. 18987.

This is a species with smooth, ellipsoid teliospores and globoid, 2-pored urediniospores, belonging to the subfamily of hosts, Heliantheae, but cannot be exactly located.

23. **Aecidium Enceliae**, sp. nov. (on Carduaceae).—*Encelia canescens* Cav., vicinity of Arequipa, Peru, August 3, no. 18792.

Aecia hypophyllous, scattered over the whole leaf surface, cylindrical, large, 0.5–0.8 mm. in diameter, 0.5–1 mm. high, at first incurved, then erect, the margin erose; aeciospores globoid, 18–21 by 21–26 μ ; wall colorless, thin, 1–1.5 μ , appearing smooth.

No aecia have been reported before on this host. There is a *Puccinia Enceliae* Diet. and Holw. known from Mexico, but no aecia have been associated with it as yet, and the chances that the present collection should be referred to it are few.

24. UREDO sp. (on *Carduaceae*).—*Baccharis* sp., vicinity of La Paz, Bolivia, August 9, no. 18840.

This collection, showing only uredinia, and with the host specifically undetermined, cannot be located with any degree of confidence.

25. UREDO ERYTHROXYLONIS Graz. (on *Erythroxytonaceae*).—*Erythroxyton Coca* Lam., La Paz, Bolivia, August 16, no. 18916.

A common rust wherever coca is cultivated. No other stage in the life cycle is known. In the present collection fully 50 per cent of the spores are distinctly paler in their lower part than above.

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New and newly combined names are in **bold-faced** type

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